

Grade 7 • Unit 9 • Assessment Guide

Putting It All Together

For the Parent or Teacher — What to look for

Unit 9 is an optional capstone. Use it to assess whether students can APPLY Grade 7 math in real-world contexts and across topics. Look for: (1) flexibility — can they combine percent, proportional reasoning, scale, and geometry? (2) estimation — Fermi problems test whether they can reason at scale without a calculator. (3) self-awareness — are they honest about what they understand and what they don't?

Part A — Year-end fluency

- Row 1: 7, 24, 24, 24, $\pi \cdot 25 = 25\pi$, $x = 6$, $6 \times 50 = 300$ m, $3/6 = 1/2$.
- ★ Mixed bag from every unit. Strong: confident with each. Weak: errors on signed numbers or percents.
- Note the $(x+5)$ substitution gives $2(12)=24$ — strong students substitute carefully.

Problem 1 — Restaurant pricing

- (a) Total cost = \$32. Per serving = $\$32/12 \approx \2.67 .
- (b) Menu price = $\$2.67 \times 2.50 \approx \6.67 .
- (c) Pre-tax: \$6.67. Tax = \$0.47. Tip = \$1.20. Total $\approx \$8.34$.
- ★ Multi-step real-world percent problem. Strong: confident with multiplicative chain. Weak: applies percents additively.

Problem 2 — Pizza pan

- Radius = 8 in. Area = 64π sq in ≈ 200.96 sq in.
- Circumference = $16\pi \approx 50.24$ in.
- ★ Watch for: using diameter (16) as radius in $A = \pi r^2$.

Problem 3 — Carpeting

- Actual: $9 \text{ m} \times 6 \text{ m} = 54$ sq m.
- Cost: \$1,350.
- ★ Tests scale + area + multiplication. Strong: each step clean.

Problem 4 — Population density

- A: $12,000/4 = 3,000$ people/sq mi.
- B: $30,000/12 = 2,500$ people/sq mi.
- A is more crowded. Ratio $3000:2500 = 6:5$ or $1.2:1$.
- ★ Strong: per-unit reasoning (population per area). Weak: just compares totals.

Problem 5 — Fermi: lifetime breaths

- Reasonable estimate: ~ 20 breaths/min $\times 60$ min $\times 24$ hr $\times 365$ days $\times 12$ years ≈ 126 million.
- ★ The PROCESS is more important than the exact number. Strong: clean chain of estimates with reasonable values.
- Weak: arithmetic errors compound or absurd starting estimates (e.g., 100 breaths per second).

Problem 6 — Spinner probabilities

- $P(D) = 1 - 0.2 - 0.3 - 0.4 = 0.1$. (Total probability must equal 1.)

- Expected B in 200 spins: $0.3 \times 200 = 60$.
- ★ Strong: invokes the 'sum = 1' rule clearly.

Problem 7 — Sampling and estimating mean

- Random sample: e.g., use random student ID generator to pick 60 students; or stratify by grade/school.
- Estimate mean ≈ 60 inches. Range: roughly 58–62 inches (within 1 MAD), or 56–64 (within 2 MAD).
- ★ Strong: confidently extends sample mean to population, uses MAD as a confidence range.
- Weak: just gives the sample mean with no range.

Problem 8 — Best topic + own problem

- Strong: picks a real topic (e.g., 'percent change'), writes a coherent problem with a verifiable answer.
- Weak: vague topic ('algebra'), problem doesn't quite work.
- ★ A great signal of confidence in a specific area.

Problem 9 — What's confusing

- No right answer — honest reflection is the goal.
- Strong: specific ('I get mixed up between supplementary and complementary' or 'inequalities when dividing by a negative').
- Weak: 'everything' or 'nothing.'

Problem 10 — Math in the real world

- Strong: a specific, concrete example (a discount sign in a store, a population statistic in the news, a probability in a game).
- Weak: vague or made-up examples.
- ★ This is the deepest test — math literacy. Are they SEEING math around them?

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